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A definition and a conceptual framework of digital disruption

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Abstract: The area of interest is digital disruption. The research question is: What is digital disruption? The contribution is based on earlier research combining a theoretical definition and a conceptual framework of digital disruption. The method is thus theoretical and conceptual; however, drawing on earlier well documented empirical data about how Netflix disrupted Blockbuster illustrating the development of the theoretical definition and the conceptual framework. Digital disruption is defined as a process whereby entrants with fewer resources are able to successfully disrupt incumbents by leveraging information-based asset and following an exponential price-performance trajectory; and the conceptual framework measures digital disruption on three impact levels: disturbance, distortion, and domination of a market and cross-tabulate this with information-based asset and an exponential price-performance trajectory. The findings can arguable be used by professional innovation managers and researchers to identify if an organization is a potential digital disrupter and measure the level of digital disruption impact.

Keywords: Digital disruption; theory; conceptual framework; disruptive innovation.

1. Introduction

The area of interest is digital disruption. In almost all areas of business and public sphere the digital transformation is often disturbing or even shaking up the current order of market places and organisations. Development in the digital area during most recent decades has made the possibility and fear of being disrupted by new business models using digital platforms, communities, digital services and a suite of new technologies more present. Characteristics applying to the digital domain and numerous discussions of

the theory of disruptive innovation call for a review and adaption of the definition. This paper is an endeavour into developing a definition and a conceptualization of digital disruption.

In academic management literature two types of digital disruption definitions can be found: (1) Conceptual definitions (e.g. Tollestrup et al. 2017), where different characteristics of digital disruption are identified and perhaps compared to disruption in general, and (2) Contextual definitions (e.g., Rosenstand et al. 2017) where digital disruption is defined by the context or the area in which it happens; typically as 'disruption in the digital domain'. Despite having previously carried out a Structured Literature Review (SLR), where all identified definitions of disruption were coded, the authors have not been able to identify an existing theoretical definition that actually – in a sufficient stringent way – states directly what digital disruption is.

No doubt, digitalization is a global mega-trend, and innovation managers across industries, public sector, and other institutions are interested in comprehending and leveraging the digital potential and avoiding being disrupted. Innovation managers would benefit from a definition as well as a concept, in order to understand and work with digital disruptive business cases.

The term disruptive innovation was popularized by Christensen in the mid 90's (Bower & Christensen 1995, Christensen 1997, Christensen & Raynor 2003) driven by the key question 'why is success so difficult to sustain?' (Christensen 2016, p. ix). Ever since disruption has been explored, discussed, and developed by important contributors. For instance, Brown (2003) considers disruptive innovation as something that changes social practices, the way we live, work and learn. It requires breaking conceptual frameworks, reframing the problem and going to the very roots of it. Lettice and Thomond (2002) define disruptive innovation as 'A successfully exploited product, service or business model that significantly transforms the demand and needs of an existing market and disrupts its former key players. Assink (2006) define disruption as 'a successfully exploited radical new product, process, or concept that significantly transforms the demand and needs of an existing market or industry, disrupts its former key players and creates whole new business practices or markets with significant societal impact'. Distinctions between commercial discontinuities and technology discontinuities have also been made (Veryzer, 1998).

While the theory of disruptive innovation has achieved enormous popularity many instances of misconceptions and overuse of the term has followed (Yu & Hang 2010; Christensen et. al., 2015). Gans also suggests a new definition of disruption: '... what a firm faces when the choices that once drove a firm's success now become those that destroy its future' (Gans 2016, p.13). Henderson is an important contributor with her focus on supply-sided disruption (the difficulty for competitors to cope with 'architectural' innovations) complementary to Christensen's demand-sided disruption (Henderson & Clark 1990). Finally, Ron Adner is also important to mention with his analysis of disruption of incumbents due to lack of competence to change a dominant design - e.g. Nokia versus Apple smartphones (Adner 2002).

Christensen's initial theory of disruption was mainly anchored in analysis of the hard-drive industry and steel mini-mills, where entrants introduced new formats, which disrupted incumbents. In these instances, the disrupted incumbents could not argue for investing in a new niche market, when they had the privilege of controlling the much more lucrative main-stream market. This is in short what Christensen terms the innovator's dilemma (Christensen 1997).

Despite the development of disruption theory and different definitions of types of disruption, Christensen's general definition of disruption seems to cover the field: 'Disruption describes a process whereby a smaller company with fewer resources is able to successfully challenge established incumbent business.' (Christensen et. al. 2015). To

this point disruption is a movement in a market between the disrupter (entrant) and the disrupted (incumbent), where the disrupter moves up-market from its market foothold in a niche position on a faster trajectory than the disrupted and the development of the market needs (e.g. Netflix's disruption of Blockbuster – c.f. 4. A conceptual framework on digital disruption); the disruption happens because the disrupter at the point of disruption supply a better price-performance regarding the up-market demand than the disrupted – the disrupter simply provide a more competitive market-fit.

2. Research question and method

An SLR of disruption and digital disruption shows that more and more widely known digital cases such as Airbnb, Facebook, and Amazon are introduced over time in the literature field of disruption (Vesti et al 2017). To this point we argue that, there is a need of a special definition and a conceptual framework of digital disruption. We use the term 'special' to specify that this need is not opposite to the general disruption theory, however the digital conditions have some special characteristics which are important to innovation management. To this point we stay on track as to where the definition and concept of disruption in the digital domain mainly has been explored as an integrated part of disruptive innovation and not as an area of study per se; an exception is Baiyere & Salmela (2013).

A definition and conceptual framework of disruptive innovation needs special development to better capture particularities of the digital domain as the world of business is being digitalized. For instance, discussions of whether specific cases such as Uber and the iPhone are disruptive innovations have surfaced (Christensen 2015, Chiaroni 2015). Digital disruption is believed to have some special characteristics that differ from those of disruption, including time issues such as being more temporarily and having higher speed of diffusion (Haase et. al. 2016). To sum up in a short research question: What is digital disruption?

In a multidisciplinary research environment on digital disruption the authors have investigated perspectives including humanities, social science, engineering, design-studies, and computer science. Until now digital disruption has in this research environment only been defined indirectly as 'disruption in the digital domain'.

In this paper we provide a special definition and conceptual framework of digital disruption, based on earlier interdisciplinary research on digital disruption – including SLR (Vesti et.al. 2017) and conceptualization (Gertsen & Tollestrup 2017). To this point the contribution is a theoretical definition and a conceptual framework utilizing the interdependencies between the theoretical definition and the conceptual framework.

The well documented digital disruptive case of Netflix's disruption of Blockbuster is used as empirical data (e.g. Gans 2016) to illustrate the definition and framework of digital disruption.

3. A definition on digital disruption

Often mentioned digital disruptive technologies such artificial intelligence, virtual reality, drones (e.g. self-driving cars), crypto economy, and additive manufacturing (e.g. 3d-printing) are all leveraged by digital technologies that make it possible to substitute (some) physical alternatives: Airbnb provides an accommodation solution without (own) physic hotels or apartments; Bitcoin provides currency without physic money; Uber provide taxis without (own) taxis and drivers; Singularity University provide executive university courses nearly without (own) research staff; and Google and Facebook provide

adds without (own) marketing agencies. The leverage of this digital technology simply withdraws the often very expensive physical component from the business model equation, and to this point we argue that the leverage of digital technology should be included in a special definition of digital disruption.

According to what Kurzweil terms as the ‘Law Of Accelerating Returns’ (Kurzweil 2005) the price-performance (often measured as performance per constant dollar – e.g. computer calculations per constant thousand dollar (Kurzweil 2012)) of digital systems are characterized by exponential price-performance development; this has been documented for a wide range of digital technologies since the end of the nineteenth century, where Moore’s Law is just one recent example. Known and well documented examples of exponential price-performance with a close to yearly doubling-factor due to digitalization are for example internet bandwidth, artificial intelligence, computer power, gene sequencing, and cloud storage. When this exponential development happens, it challenges the common linear business intuition and prediction (Kurzweil 2012). A yearly doubling over 10, 20 or 30 years is around a factor thousand (2^{10}), factor million (2^{20}), and factor billion (2^{30}), respectively. An example is the smart-phone, where the first model was introduced only a decade ago by Apple in 2007. In this paradigm the past price-performance development will seem nearly flat according to the one to come. If you place yourself at the 10th doubling out of 20 on an exponential trajectory and look back and forward, then you will only see an increase of approximately a factor thousand when looking back, which is practically nothing compared to the factor million from the start of the trajectory when looking forward. More and more domains are digitalized and thus potentially impacted by the ‘Law Of Accelerating Returns’ – e.g. regenerative medicine, solar power, farming and fishing drones, augmented reality glasses, and 3d-printing. To this point we argue that exponential price-performance development of digital technologies also should be included in a specific definition of digital disruption.

Drawing on Christensen’s definition and the academic discussion of it (cf. Introduction) we suggest the following initial definition as a foundation for a specific theory of digital disruption: ‘Digital disruption is a process whereby entrants with fewer resources are able to successfully disrupt incumbents by offering a value proposition based on a digital technology and a value network utilizing an exponential price-performance trajectory’, entrants are new organizations or a new business unit inside an incumbent organization. The definition is exemplified in Table 2, including examples on digital technologies and exponential price-performance trajectories. And organization can be anything from a project over a company to an institution. Disruption is in its theoretical origin described as a threat to incumbents, however with digital disruption we argue that the opposite perspective is also relevant, where digital disruption is a core opportunity to sustain or gain exponential growth for both entrants and incumbents; the latter through new business units.

4. A conceptual framework on digital disruption

The conceptual framework presented in this paper is developed on an earlier first draft of a conceptual model of digital disruption presented at ISPIM in Melbourne (Gertsen & Tollestrup 2017). The conceptual model provided a scale of disruption indicating market impact of digital disruption measured on what is termed as three levels of disruption. It starts with (1) ‘disturbance’ as a niche market foothold, then potentially developing into a (2) ‘distortion’ of an existing market (alternatively creating a new market – c.f. new market disruption), and then probably finally develop into a market (3) ‘dominator’. In Table 1 and 2 this is cross-tabulated to a conceptual framework with the two core

characteristics of digital disruption from the definition above (cf. 3 A definition of digital disruption); (1) digital technology (value proposition) and an (2) exponential price-performance trajectory (value network). This is listed in Table 1 including value-questions to the disrupter. In Table 2 the cross-tabulation is exemplified with Netflix and Blockbuster.

Table 1 Value proposition and value network

<i>Value</i>	<i>Regards</i>	<i>Value-questions to the disrupter (e.g. Netflix)</i>
Proposition (digital technology)	Technology	Which digital technology do you leverage?
	Purpose	Why is your offer smarter than the one you disrupt?
	Customer	What is the new user behaviour according to a need?
Network (Exp. price- performance trajectory)	Growth	Which exponential digital trajectory do you leverage?
	Actor	Who is involved and how are they connected?
	Market	How do you transform the market?

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Table 2 Conceptual framework of digital disruption.

		Digital technology - value proposition - WHAT DIGITAL VALUE ARE YOU OFFERING?		Exponential price-performance trajectory - network proposition - HOW IS USER VALUE GENERATED?	
D I G I T A L D I S R U P T I O N I M P A C T	DOMINATE 2013- Block-buster closes the last store in USA	Technology	Streaming of movies fits an international mainstream market. Blockbuster becomes obsolete in 2013 (the last store close in US).	Growth	Internet bandwidth, Multi-platform technology, cloud computing, personalised search algorithm (AI), big data (predictive analytics of user patterns)
		Purpose	Streaming movies becomes faster and better than videos and DVDs.	Actors	Studio provides movies; however some movies and serials are produced on Netflix big data user knowledge.
		Customer	The access to high speed internet is international new normal.	Market	Subscription of multiplatform video streaming creates access to users in multiple contexts
	DISTORT 2007- Netflix introduce streaming	Technology	Streaming of movies (first as a supplement) on the web-platform for subscription. No DVDs and no postal service.	Growth	Internet bandwidth, platform technology, servers.
		Purpose	Access to movies is now faster than renting a movie in one of Blockbuster's 9.000 shops worldwide.	Actors	Studios provide the movies. Netflix build a community of customers on its platform.
		Customer	The access to internet is new normal in USA households.	Market	Subscription of video streaming creates a market for movies as a utility.
	DISTURB 1997- Netflix as a start-up	Technology	Web-platform for subscription of DVDs. No shops and nearly no staff.	Growth	Internet platform, server. Allegedly the idea was to do something like Amazon, just not with books.
		Purpose	Netflix was allegedly founded in 1997 because the founder was frustrated over a 40 dollar fine from BlockBuster.	Actors	Studios provide the movies and the postal service the distribution.
		Customer	Some niche costumers are willing to wait for postal mail if they in return have access to special movies	Market	Subscription offers a market without annoying fines.

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5. Conclusion

In this paper the research-question: “What is digital disruption?” have been unfolded as an interdependent and consistent theoretical definition and a conceptual framework on digital disruption.

It is arguable a necessary capability that both information-based assets and an exponential price-performance trajectory is present from an entrant’s very beginning of digital disruption in order to gain a successful market impact through the levels of disturbance, distortion, and domination. To this point the conceptual framework can arguable be used by professional innovation managers and researchers to identify if an organization is a potential digital disrupter and measure the impact-level of digital disruption. This argument need further support through empirical research following potential disrupters.

Further research on specific metrics for digital disruption and measurements of price-performance is clearly needed; when is a company a disturber, a distorter, or a dominator?

6. Areas for feedback and development

How to use the definition and conceptual framework for further research?

Is the conceptual framework to simple or to complex?

How do we measure the here and now empirical level of digital disruption?

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